

REMARKS

The present Amendment amends claims 2-6 and cancels claim 1. Therefore, the present application has pending claims 2-6.

Claims 1-4 stand rejected under 35 USC §103(a) as being unpatentable over Freeman (EP No. 973292 A2) in view of Schurgers (article entitled "Adaptive Turbo Decoding for Indoor Wireless Communication"); and claims 5 and 6 stand rejected under 35 USC §103(a) as being unpatentable over Freeman and Schurgers in view of Dissosway (U.S. Patent No. 4,903,262). As indicated above, claim 1 was canceled. Therefore, the above described rejection of claim 1 under 35 USC §103(a) as being unpatentable over Freeman in view of Schurgers is rendered moot. These rejections with respect to the remaining claims 2-6 is traversed for the following reasons. Applicants submit that the features of the present invention as now more clearly recited in claims 2-6 are not taught or suggested by Freeman, Schurgers or Dissosway whether taken individually or in combination with each other as suggested by the Examiner. Accordingly, reconsideration and withdrawal of this rejection is respectfully requested.

Amendments were made to the claims to more clearly describe features of the present invention. Particularly, amendments were made to the claims so as to more clearly recite that the present invention is directed to a turbo decoder, a mobile station including a turbo decoder and a base station including the turbo decoder.

The turbo decoder according to the present invention includes a decoder for inputting data turbo-coded for correcting an error and repeatedly carrying out soft output decoding to thereby restore original data, judging

means for judging reliability of a soft output decoding result from the decoder provided by the soft output decoding from statistics of the soft output decoding result and controlling means for controlling the number of iteration of the soft output decoding based on a result of judgment, by the judging means, of the reliability of the soft output decoding result from the decoder.

According to the present invention, the judging means uses, as the statistics from judging the reliability of the soft output decoding result from the decoder, one of a mean value and dispersion value of the soft output decoding result from the decoder, a mean value and a minimum value of the soft output decoding result from the decoder and a maximum and a minimum value of the soft output decoding result from the decoder.

Thus, as is clear from the above, the present invention makes use of the result from the soft output decoding in order to determine the number of iterations performed by the soft output decoder so as to make the reliability of the judgment performed by the judging means simple to perform without overtaxing the calculation ability of the processor. By use of the features of the present invention as now more clearly recited in the claims the reliability of the soft output decoding improves as the results of such calculations develop as is seen from the curve of Fig. 3(a)-(c). Accordingly, the present invention provides an apparatus which uses easy to measure characteristics, determining the number of iterations to be performed by the soft output decoder which requires very minimal calculation power on the part of the processor. Such features are clearly not taught or suggested by any of the references of record whether taken individually or in combination with each other.

Numerous arguments were presented distinguishing the features of the present invention from the references of record particularly Freeman and Dissosway in the August 9, 2004 and March 24, 2004 Amendments, said Remarks being incorporated herein by reference. It was particularly shown and as recognized by the Examiner that Freeman does not teach or suggest the soft iteration of the decoding processing. As now more clearly recited in the claims, the soft iteration of the decoding process is implemented by the controlling means which now recites that it controls the number of iterations of the soft output decoding based on a result of judgment, by the judging means, of the reliability of the soft output decoding result from the decoder. Such features are clearly not taught or suggested by Freeman and as such is freely admitted by the Examiner.

However, in the Office Action the Examiner attempts to supply the above noted deficiencies of Freeman with alleged teachings in Schurgers of a soft coding iteration process. However, Schurgers does not include any teaching or suggestion therein to support the Examiner's allegation that Schurgers teach soft output decoding which is missing from Freeman and to which the claims of the present application are directed.

In the Office Action the Examiner points to alleged teachings in sections 4 and 5 and in Fig. 8 of Schurgers which supposedly teaches the soft output decoding as in the present invention. However, it is quite clear that the alleged soft output decoding according to the present invention is not taught or suggested by Schurgers in these passages of Schurgers. In fact, Schurgers does not make use of the result from the decoder so as to perform

the operation of controlling the number of iterations of the soft output decoding as in the present invention.

Sections 4 and 5 of Schurgers simply provides a teaching regarding the incorporation of channel fading parameters such as a ratio of E_b to n_0 . Schurgers teaches that this is a quality of received signal which can be measured before decoding. There is absolutely no teaching or suggestion in Schurgers that this indication of quality changes as a result of an iterated soft output decoding process as in the present invention. The present invention as clearly described, for example, on page 10, line 16 through page 11, line 9 of the present application provides that the process of controlling the number of iterations of the soft output decoding is based on a result of judgment of the reliability of the soft output decoding result from the decoder. Such is clearly not taught or suggested by Schurgers.

In Schurgers, using E_b/n_0 would not be equivalent to using the result from the soft output decoding so as to determine the number of iterations of the soft output decoding as in the present invention as recited in the claims.

Section 4 of Schurgers seem to describe controlling the iteration number using the output of the decoder. Attention is directed to page 109 right column, lines 20-25 of Schurgers. In this passage of Schurgers, there is a teachings that the probability " $P_{corr}(i)$... a block of length K is correct after the i th iteration"... "when $P_{corr}(i)$ is higher than a threshold the decoding is stopped". Schurgers uses this expression to obtain $P_{corr}(i)$. However, the calculation performed by Schurgers is complicated and requires a considerably larger processing power compared with the method of the present invention as recited in the claims.

Particularly, Schurgers does not teach or suggest that the quality calculated therein is used to determine the reliability as recited in the claims of the present application. For example, claim 2 of the present application recites that the judging means in order to judge reliability uses a mean value and a dispersion value of the soft decoding result from the decoder as statistic for judging the reliability, claim 3 recites that the judging means uses a means value and a minimum value of the soft decoding as statistic for judging the reliability, claim 4 recites that the judging means uses a maximum value and a minimum value of the soft decoding result as statistic for judging the reliability and each of claims 5 and 6 recite a judging means which uses one of the above described values. Such teachings are clearly not provided in Schurgers or any of the other references of record whether taken individually or in combination with each other.

Thus, as per the above, both Freeman and Schurgers fail to teach or suggest controlling means for controlling the number of iterations of the soft output decoding based on a result of judgment, by the judging means, of the reliability of the soft output decoding result from the decoder as recited in the claims.

Further, both Freeman and Schurgers fail to teach or suggest judging means for judging a reliability of a soft output decoding result from the decoder provided by the soft output decoding from statistics of the soft output decoding result as recited in the claims.

Still further, both Freeman and Schurgers fail to teach or suggest that the judging means uses a means value and a dispersion value of the soft output decoding result from the decoder as the statistic for judgment reliability

of the soft output decoding result from the decoder, uses a mean value and a minimum value of the soft output decoding result from the decoder as a statistic for judging the reliability of the soft output decoding result from the decoder, or uses a maximum value and a minimum value of the soft output decoding result from the decoder as a statistic for judging the reliability of the soft output decoding result from the decoder as recited in the claims.

Therefore, the combination of Freeman and Schurgers fail to teach or suggest the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 USC §103(a) rejection of claims 2-4 as being unpatentable over Freeman in view of Schurgers is respectfully requested.

The above noted deficiencies of both Freeman and Schurgers are not supplied by any of the other references of record. Particularly, these features now more clearly recited in the claims are not taught or suggested by Dissosway.

Dissosway is merely relied upon by the Examiner for an alleged teaching that the turbo decoder is part of a transmitting/receiver in the mobile communication system. However, Dissosway does not teach or suggest such an apparatus particularly one that performs the operations as recited in the claims shown above not to be taught or suggested by either Freeman or Schurgers.

Thus, combining the teachings of Freeman, Schurgers and Dissosway in the manner suggested by the Examiner in the Office Action still fail to teach or suggest the features of the present invention as now more clearly recited in the claims. Therefore, reconsideration and withdrawal of the 35 USC §103(a)

rejection of claims 5 and 6 as being unpatentable over Freeman, Schurgers and Dissosway is respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references utilized in the rejection of claims 1-6.

In view of the foregoing amendments and remarks, applicants submit that claims 2-6 are in condition for allowance. Accordingly, early allowance of claims 2-6 is respectfully requested.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417 (520.40478X00).

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.



Carl I. Brundidge
Registration No. 29,621

CIB/jdc
(703) 684-1120